



General

Guideline Title

AARC clinical practice guideline: effectiveness of nonpharmacologic airway clearance therapies in hospitalized patients.

Bibliographic Source(s)

Strickland SL, Rubin BK, Drescher GS, Haas CF, O'Malley CA, Volsko TA, Branson RD, Hess DR. AARC clinical practice guideline: effectiveness of nonpharmacologic airway clearance therapies in hospitalized patients. *Respir Care*. 2013 Dec;58(12):2187-93. [59 references] [PubMed](#)

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Hospitalized Adult and Pediatric Patients Without Cystic Fibrosis

Recommendations Supported by Low-Level Evidence

1. Chest physiotherapy (CPT) is not recommended for the routine treatment of uncomplicated pneumonia.
2. Airway clearance therapy (ACT) is not recommended for routine use in patients with chronic obstructive pulmonary disease (COPD).
3. ACT may be considered in patients with COPD with symptomatic secretion retention, guided by patient preference, toleration, and effectiveness of therapy.
4. ACT is not recommended if the patient is able to mobilize secretions with cough, but instruction in effective cough technique (e.g., forced expiratory technique [FET]) may be useful.

Adult and Pediatric Patients with Neuromuscular Disease, Respiratory Muscle Weakness, or Impaired Cough

Recommendations Supported by Low-Level Evidence

1. Cough assist techniques should be used in patients with neuromuscular disease (NMD), particularly when peak cough flow is <270 L/min.
2. CPT, positive expiratory pressure (PEP), intrapulmonary percussive ventilation (IPV), and high-frequency chest wall compression (HFCWC) cannot be recommended, due to insufficient evidence.

Postoperative Adult and Pediatric Patients

Recommendations Supported by Low-Level Evidence

1. Incentive spirometry is not recommended for routine, prophylactic use in postoperative patients.
2. Early mobility and ambulation is recommended to reduce postoperative complications and promote airway clearance.
3. ACT is not recommended for routine postoperative care.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Any disease/condition requiring airway clearance therapy (ACT)

Guideline Category

Evaluation

Management

Treatment

Clinical Specialty

Critical Care

Geriatrics

Internal Medicine

Pediatrics

Pulmonary Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Hospitals

Nurses

Physician Assistants

Physicians

Respiratory Care Practitioners

Guideline Objective(s)

- To determine whether the use of nonpharmacologic airway clearance therapy (ACT) improves oxygenation, reduces length of time on the ventilator, reduces stay in the intensive care unit (ICU), resolves atelectasis/consolidation, and/or improves respiratory mechanics, versus usual care in 3 populations
- To provide guidance to clinicians in the identification, selection, and application of ACT techniques

Target Population

- Hospitalized adult and pediatric patients without cystic fibrosis
- Adult and pediatric patients with neuromuscular disease, respiratory muscle weakness, or impaired cough
- Postoperative adult and pediatric patients

Interventions and Practices Considered

1. Airway clearance therapy (ACT) in patients with chronic obstructive pulmonary disease (COPD) with symptomatic secretion retention
2. Effective cough technique, including forced exhalation technique (FET)
3. Early mobility and ambulation

Note: The following interventions were considered but not recommended due to insufficient evidence:

Chest physiotherapy (CPT)
Positive expiratory pressure (PEP)
Intrapulmonary percussive ventilation (IPV)
High-frequency chest wall compression (HFCWC)
Incentive spirometry

Major Outcomes Considered

- Length of stay in intensive care unit (ICU)
- Resolution of atelectasis/consolidation, and/or improved respiratory mechanics
- Pulmonary function
- Sputum weight/volume
- Oxygenation
- Gas exchange
- Pulmonary complications
- Duration of ventilation
- Heart rate
- Dyspnea
- Harms of airway clearance techniques
- Mean arterial pressure
- Breathing frequency
- Exercise tolerance
- Quality of life
- Need for mechanical ventilation
- Hospital readmission (time to exacerbation)

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Strategy

The primary literature search employed the MEDLINE (via the PubMed interface) and Cumulative Index of Nursing and Allied Health Literature (CINAHL) databases. The search strategies used a combination of subject heading terms appropriate for each database and key words relevant to airway clearance (e.g., sputum clearance, CPT). Reviewers limited searches to literature published in English since 1990 to ensure that interventions used currently would be represented. The searches were conducted in August 2012. Reviewers imported all citations into an electronic database and into the DistillerSR program for screening. They also manually searched the reference lists of included studies and of recent narrative and systematic reviews and meta-analyses addressing airway clearance in adults to locate citations of potential relevance.

Inclusion and Exclusion Criteria

Studies needed to include subjects over 1 year of age without cystic fibrosis, who were receiving nonpharmacologic airway clearance therapies and who were either hospitalized (but not postoperative) or postoperative, had neuromuscular disease or respiratory muscle weakness, or who had impaired cough. Note that reviewers excluded studies of subjects with cystic fibrosis, as the Cystic Fibrosis Foundation recently published guidelines specifically related to airway clearance. Studies had to report on interventions explicitly used for airway clearance and include a treatment group and an appropriate comparison group (see Table 1 in the systematic review [see the "Availability of Companion Documents" field]). Comparators included other nonpharmacologic airway clearance approaches, no airway clearance intervention, or placebo. The reviewers also required that studies address one of the outcomes related to the effects of the intervention on mucus clearance outlined in Table 1 in the systematic review. Studies with any length of follow-up and in the hospital setting (i.e., not home- or out-patient-clinic-based) were included.

Study Selection

Once they identified potential articles, reviewers examined the abstracts to determine whether studies met the inclusion criteria. Two reviewers separately evaluated each abstract for inclusion or exclusion, using an abstract review form. If one reviewer concluded that the article could be eligible for the review based on the abstract, it was retained for full text assessment. Two reviewers independently assessed the full text of each included study, using a standardized form that included questions stemming from the inclusion/exclusion criteria. Disagreements between reviewers were resolved by a third-party adjudicator. The group of abstract and full text reviewers included expert clinicians and health services researchers, and studies had to be excluded by at least one clinician and one methodologist. AARC members involved in screening were paired with Vanderbilt Evidence-Based Practice Center staff in order to maintain rigor and protect against bias.

Number of Source Documents

32 studies met the review criteria, including 24 randomized controlled trials, 7 crossover randomized controlled trials, and one prospective cohort study.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Not Given)

Rating Scheme for the Strength of the Evidence

Not stated

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Data Extraction and Synthesis

Reviewers extracted data on study design, population characteristics (including age, underlying conditions, and need for mechanical ventilation), intervention characteristics (including type and duration of intervention and concomitant therapies), and key outcomes data into evidence tables. In addition to outcomes related to airway clearance intervention effectiveness, reviewers extracted all data available on harms of airway clearance. Harms encompass the full range of specific negative effects, including the narrower definition of adverse events. Reviewers determined that the differences among populations, interventions, controls, and outcome measures rendered meta-analysis inappropriate. Thus, the analysis was qualitative.

Quality (Risk of Bias) Assessment of Individual Studies

Reviewers assessed quality using separate tools, as appropriate by study design. Tools included the Cochrane Risk of Bias tool for randomized controlled trials (RCTs) and the Newcastle-Ottawa scale for cohort studies. Reviewers rated the quality for key outcomes for which data were provided. If a study noted, for example, that a given outcome was not significantly different between groups but did not provide the relevant data, the authors did not rate quality for that outcome. Two reviewers independently assessed the quality of each study, with final decisions made via discussion to reach consensus or by third-party adjudication by a senior methodologist, as needed. The parameters outlined in Table 2 in the systematic review (see the "Availability of Companion Documents" field) were used to translate quality ratings into final levels (good, fair, poor). Reviewers defined "good" studies as not having any of the criteria that create a high risk of bias. For studies with "unclear" ratings, they considered the likelihood that a factor would bias a given outcome and the importance of the limitation and down-graded the final level as appropriate.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The American Association for Respiratory Care (AARC) commissioned a systematic literature review (see the "Availability of Companion Documents" field), and AARC committee members participated in the review process. As a collaborative effort, the AARC team and the Vanderbilt Evidence-Based Practice Center developed the key questions and inclusion and exclusion criteria, and engaged in identification and review of abstracts. The AARC members involved in the work were paired with Vanderbilt Evidence-Based Practice Center staff in order to maintain rigor and protect against bias.

Because no high-level evidence was available and the recommendations are based on low-level evidence, the guideline authors have not used a formal guideline development process such as the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system. Rather, the recommendations are based on a consensus of the committee, informed by a systematic review of the literature (see the "Availability of Companion Documents" field) and clinical experience. The systematic review helped frame the issues and allowed for an identification of potential harms.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on a consensus of the committee, informed by a systematic review of the literature (see the "Availability of Companion Documents" field) and clinical experience. No high-level evidence was available and the recommendations are based on low-level evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate utilization of nonpharmacologic airway clearance therapies in hospitalized patients

Potential Harms

The harms of airway clearance techniques were not consistently reported, though airway clearance techniques were generally considered safe in studies that did comment on adverse effects. Further research with clearly characterized populations and interventions is needed to understand the potential benefits and harms of these techniques.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Strickland SL, Rubin BK, Drescher GS, Haas CF, O'Malley CA, Volsko TA, Branson RD, Hess DR. AARC clinical practice guideline: effectiveness of nonpharmacologic airway clearance therapies in hospitalized patients. *Respir Care*. 2013 Dec;58(12):2187-93. [59 references] [PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2013 Dec

Guideline Developer(s)

American Association for Respiratory Care - Professional Association

Source(s) of Funding

American Association for Respiratory Care (AARC)

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

Authors: Shawna L Strickland, PhD, RRT-NPS, AE-C, FAARC; Bruce K Rubin, MD, MEng, MBA, FAARC; Gail S Drescher, MA, RRT; Carl F Haas, MLS, RRT, FAARC; Catherine A O'Malley, RRT-NPS; Teresa A Volsko, MHHS, RRT, FAARC; Richard D Branson, MSc, RRT, FAARC; Dean R Hess, PhD, RRT, FAARC

Financial Disclosures/Conflicts of Interest

Dr Rubin has disclosed relationships with GlaxoSmithKline, Pfizer, InspiRx, Fisher & Paykel, Teleflex, Philips Respironics, Novartis, Electromed, and Salter Labs.

Ms O'Malley has disclosed relationships with Novartis and Pari Respiratory Equipment.

Mr Branson has disclosed relationships with Covidien, Hamilton Medical, Advanced Circulatory Systems, Ikaria, Bayer, and Breathe Technologies.

Dr Hess has disclosed relationships with Philips Respironics, Pari Respiratory Equipment, Covidien, Maquet, and Merck.

The other authors have disclosed no conflicts of interest.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the [Respiratory Care Journal Web site](#) .

Print copies: Available from the American Association for Respiratory Care (AARC), 9425 N. MacArthur Blvd., Ste. 100, Irving, TX 75063.

Availability of Companion Documents

The following is available:

- Andrews J, Sathe NA, Krishnaswami S, McPheeters ML. Nonpharmacologic airway clearance techniques in hospitalized patients: a systematic review. *Respir Care*. 2013 Dec;58(12):2160-86. Electronic copies: Available from the [Respiratory Care Journal Web site](#) .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on April 9, 2014.

Copyright Statement

This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions.

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouse[®] (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the [NGC Inclusion Criteria](#).

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.